



# Targeting planning and problem-solving versus basic cognition in cognitive remediation for patients with schizophrenia

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## Background

Cognitive deficits are important predictors of functional outcome in patients with schizophrenia. Approaches to psychological treatment of cognitive deficits have been subsumed under the term cognitive remediation. There is now converging evidence that cognitive remediation has moderate effects on cognitive performance (McGurk et al., 2007). Importantly, these improvements can generalize to functional outcome, particularly when cognitive remediation is combined with comprehensive rehabilitation.

When addressing the question which cognitive functions to target, a major goal is an effect on functional outcome. While an influence of basic cognition on functional outcome has been established, it has been suggested that at least part of this effect is mediated by intermediate functions such as social cognition or learning ability (Green et al., 2000; Vauth et al., 2004). These potential mediators have been proposed as potential targets for training interventions in contrast to the "traditional" training of basic cognition. One cognitive domain of potential clinical relevance is planning and problem-solving (Medalia et al., 2001), which requires the integration of basic cognitive functions. This capacity has been shown to be closely associated with functional outcome.

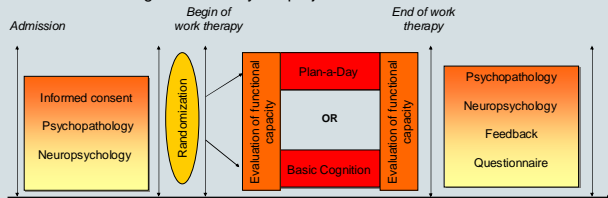
## Goals and Hypotheses

We carried out a single-blind randomised trial comparing planning and problem-solving training (Plan-a-Day) with training of basic cognitive functions (processing speed, attention, memory). The study hypotheses were:

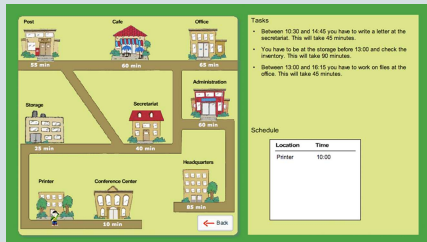
- (1) Planning and problem-solving training improves functional capacity more than training of basic cognition after three weeks of cognitive remediation.
- (2) Planning and problem-solving training improves problem-solving capacity and planning ability more than traditional training programs addressing basic cognition after three weeks of cognitive remediation.

## Methods

**Subjects:** 89 patients with schizophrenia were recruited from an inpatient rehabilitation unit at the mental health institution Karlsbad Langensteinbach, Germany. Patients were living in the community and entering a treatment program aimed at facilitating return to work. Following completion of the baseline assessments, participants were randomly assigned to one of the two training conditions by the project coordinator.



**Interventions:** Participants were engaged in 10 training sessions of computer-based cognitive exercises. The training intervention with Plan-a-Day focuses on training participants to use a small set of simple but effective planning and decision-making heuristics to provide effective strategies for dealing with common goal-conflict situations in Plan-a-Day and everyday life. In addition to computer exercises, patients included in the group working with Plan-a-Day participated in a transfer to everyday situations group. This basic cognition group trained three different tasks: processing speed, attention and topological memory.



**Outcomes:** Functional capacity was assessed with the Osnabrück Work Capabilities Profile (German: Osnabrücker Arbeitsfähigkeiten Profil, O-AFP; Wiedl & Uhlhorn, 2006), a 30-item inventory developed specifically for the purpose of assessing behaviour at work for persons with severe and persistent mental illness. The O-AFP consists of three scales "Learning Ability", "Social Communication Ability" and "Adaptation". Planning and problem-solving was primarily measured with a diagnostic version of Plan-a-Day (PAD; Funke & Krüger, 1995, see figure). This tool is a modified version of the training program. For diagnostic purposes, participants complete eight day plans. The main scoring criterion is total solution time. In addition, planning ability in less complex scenarios was measured with a Tower of London analog (Planungstest), and the Zoo-Map subtest from the Behavioural Assessment of Dysexecutive Syndrome (BADS).

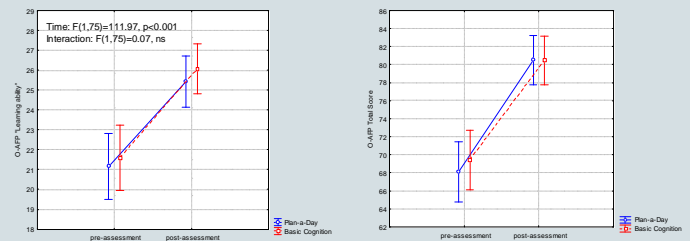
## Results

**Demographic and clinical variables:** Groups did not differ significantly on any measure.

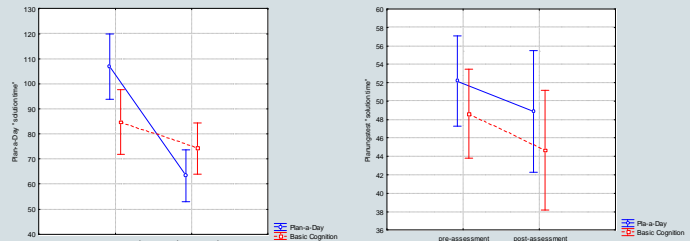
	Plan-a-Day (N=38)	Basic Cognition (N=39)
sex (m/w)	32/6	30/9
Age (mean)	28,03	29,46
years of education (mean)	14,68	15,55
Age of 1st hospitalization (mean)	23,03	25,70
Global Assessment of Functioning	60,00	60,05
Baseline PANSS total	31,29	32,23
Three-week PANSS total	27,71	28,41

Outcomes were analyzed with MANOVA implemented in SPSS 16.

**Effects of three weeks cognitive remediation on functional capacity:** non significant interaction in scores for O-AFP learning ability subscale and total score, significant main effect of time on both measures:



**Effects of three weeks cognitive remediation on planning and problem-solving ability:** significant interaction in Plan-a-Day and significant main effect over time in both tests (Plan-a-Day and Planungstest):



## Discussion

Improvements in functional capacity and cognitive functioning were observed after training of planning and problem-solving as well as basic cognition. This finding is consistent with previous studies showing beneficial effects of integrating cognitive remediation with a broader rehabilitation program (McGurk et al., 2007; Bell et al., 2008).

However, there was no differential effect on functional capacity. This finding diverges from Medalia et al (2001) who found a benefit of problem-solving over memory training on the independent living scale. In our study, the large sample and pattern of results render a lack of power unlikely. A number of other issues could account for the lack of differential effect, e.g. duration of training, setting, patient selection and group vs individual sessions.

Small differences on cognitive outcome variables might indicate a potential of differential effects. This will have to be addressed in further research including longer treatment programs and other settings.

At present there is no conclusive evidence that training different cognitive functions leads to differential improvement in patient-relevant outcome measures at the group level.

## References

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